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EXAMINER	
JUNTIMA, NITTAYA	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/645,837	KALLSTENIUS, THOMAS	
	Examiner	Art Unit	
	Nittaya Juntima	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *8/22/03*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-70* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *18-33* is/are allowed.

6)☒ Claim(s) *1-4,6-11,13-15,34-38,40-42,45-47,55-62 and 64-70* is/are rejected.

7)☒ Claim(s) *5,12,16,17,39,43,44 and 48-54* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 August 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/13/04,6/20/05,10/24/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. Figures 1-4 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated (see specification, paragraphs 6, 8, 9, and 10). See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities:

- in paragraph 9, line 1, "P" should be changed to "Q" and
  line 2, "Q" should be changed to "P";
- in paragraph 49, line 4, "8B" should be changed to "7B" since Fig. 8B does not exist;
- in paragraph 58, line 2, "7" should be changed to "7A" since Fig. 7 does not exist.

Appropriate correction is required.

Claim Objections

3. Claims 49, 55, and 65-70 are objected to because of the following informalities:

- in claim 49, line 1, "claim 45" should be changed to "claim 48" in order for the claimed multiple sets of first and second time differences to be consistent with the multiple sets of first and second time differences of claim 48;

- in claim 55, line 12, "a second oscillator" should be changed to "the second oscillator" to refer to the second oscillator cited in line 11 of the claim.

- in claim 65, line 1, "claim 34" should be changed to "claim 55" in order for the controller of the node to be consistent with the controller of independent claim 55.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 55-70 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 55, lines 4-5, the limitation "the first node" lacks antecedent basis;

line 6, the limitation "the second node" lacks antecedent basis;

line 11, the limitation "the second oscillator" lacks antecedent basis.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 4, 7-8, 11, 13-15, 34-37, 40-42, 45-46, 55-56, 58-60, and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (hereinafter "APA") in view of Scott (US 2004/0258099).

Regarding claim 1, as shown in Fig. 3, APA teaches a communication system comprising:

A first node (timeserver Q) having a first oscillator (since the slope ρ shown in Fig. 4 corresponds to the client's oscillator frequency drift compared to the timeserver, paragraph 10, therefore, a first oscillator must be included in the timeserver Q) for sending multiple messages over a network and including or associating with each message a first timestamp (t_3) corresponding to a time when the first node sent that message (messages with timestamp t_3 are sent from timeserver Q to client P, paragraphs 9-10 and Fig. 4).

A second node (client P) having a second oscillator (client P's oscillator) for receiving each message and associating with that message a second timestamp (t_4) corresponding to a time when the second node received that message (t_4 is added to messages received at client P, paragraphs 9-10 and Fig. 4).

Wherein one of the first and second nodes (client P) is configured to determine for each message a first time difference (Δt_{43}) between the corresponding first and second timestamps, and from multiple first time differences, to fit a line (a dashed line in Fig. 4) of the first time differences, a characteristic of the line being related to a frequency drift (the drift slope ρ, Fig. 4) between the first and second oscillators (Δt_{43} is calculated and evaluated by the client, paragraph

9, and Δt_{43} is compared with the absolute time t_4 in the client and plotted against t_4 in Fig. 4, paragraph 10).

Wherein the one node (client P) is configured to determine from the line a frequency adjustment (the drift slope ρ, Fig. 4) to synchronize the first and second oscillators (the drift slope ρ of the line is determined, paragraph 10).

However, APA fails to explicitly teach fitting a line to two or more minimum delay values.

Scott teaches a system in which two or more minimum delay values (minimum packet delay/transit time values) are determined in order to indicate drift between the source and destination clock frequencies (paragraph 42, see also paragraphs 39-41 and 43-52) and plotting minimum delay values against time (Fig. 4 and paragraph 73).

Given the teaching of Scott on minimum delay values, it would have been obvious to one skilled in the art at the time of the invention to modify the teaching of APA to utilize minimum delay values such that fitting a line to two or more minimum delay values would be included as claimed. The suggestion to do so would have been to provide the indication of drift between the source and destination clock frequencies, independently of changes in network loading as suggested by Scott (paragraph 42, lines 4-8).

Regarding claim 4, although APA teaches that the one node is the second node (client P, paragraph 10), APA does not explicitly teach that the second node is configured to adjust the second oscillator using the frequency adjustment. However, since APA teaches that the drift slope ρ in Fig. 4 corresponds to the client's frequency drift compared to the timeserver

(paragraph 10), i.e., the drift slope ρ is the difference between the timeserver's frequency and client's frequency, it would have then been obvious to one skilled in the art at the time of the invention to modify the teaching of APA to include that the second node is configured to adjust the second oscillator using the frequency adjustment. The motivation to do so would have been to correct the client's frequency by the drift slope ρ, thereby enabling frequency synchronization between the timeserver and the client.

Regarding claim 7, as shown in Fig. 3, APA teaches that the first node is a timeserver (timeserver Q) and the second node is a client node (client P) and the messages are transported over a packet-switched network (paragraph 9).

Regarding claim 8, APA teaches that the system is a mobile communications system, the first node (timeserver Q) is a radio network controller (a RNC) and the second node is a radio base station (a RBS) (paragraph 8, line 3).

Regarding claim 11, as shown in Fig. 4, APA teaches that the characteristic of the line is a slope ρ of the line (paragraph 10).

Regarding claim 13, APA does not teach that the one node is configured to determine an equation of a line that intersects the two minimum first time difference values. However, an examiner notice is taken that it is well known that when a line having a slope of "a" is plotted on a graph with y-axis and x-axis in which the slope "a" is determined from the x and y values, i.e.,

slope "a" = $(y_2-y_1)/(x_2-x_1)$, a linear equation $y = ax + b$ can be determined. Therefore, since APA teaches that a linear dashed line having a slope ρ in Fig. 4 which intersects time difference values Δt_{43}, and Scott teaches two minimum first time difference values (paragraph 42, see also paragraphs 39-41 and 43-52), it would have then been obvious to one skilled in the art at the time of the invention to determine an equation of a line (i.e., $y = \rho x + b$) that intersects (passing through) the two minimum first time difference values. The motivation to do so would have been to calculate the slope of the line.

Regarding claim 14, APA does not teach that the node (client P, Fig. 3) is configured to determine the two minimum first time difference values from the multiple time differences that are farthest apart.

However, Scott teaches that minimum delay values are determined from multiple time delay values that are farthest apart (minimum delay transit time values are filtered out from other transit time values including those that are farthest apart, paragraph 60 and Fig. 3).

Given the teaching of Scott, it would have been obvious to one skilled in the art at the time of the invention to modify the teaching of APA such that the node would be configured to determine the two minimum first time difference values from the multiple time differences that are farthest apart. The suggestion/motivation to do so would have been to provide the indication of drift between the source and destination clock frequencies independent of changes in network loading (Scott, paragraph 42, lines 4-8).

Regarding claim 15, it is inherent that the node (client P) in Fig. 3 of APA must determine an optimal number of minimum values (optimal is relative, reads on two) of the first time differences (Δt_{43}) to be used in fitting the line since (i) the first time differences Δt_{43} are compared with local time values t_4 in the client and Δt_{43} is calculated and evaluated by the client (paragraphs 9-10) and (ii) it takes at least two values of Δt_{43} to fit a line.

Claims 34, 35, 36, 37, 40, 41, 42, 45, and 46 are a method claim corresponding to system claims 1, 11, 12, 4, 13, 14, 15, 7, and 8, respectively, and are therefore rejected under the same reason set forth in the rejection of claims 1, 11, 12, 4, 13, 14, 15, 7, and 8, respectively.

Claims 55, 56, 58, 59, 60, and 64 are node claims (it is inherent that a controller must be included in the client P node, Fig. 3 in order to control the functions of the node) containing similar limitations to a second node claimed in system claims 1, 11, 13, 14, 15, and 8, respectively, and are therefore rejected under the same reason set forth in the rejection of claims 1, 11, 12, 13, 14, 15, and 8, respectively.

7. Claims 2-3, 6, 9-10, 38, 47, and 63 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (hereinafter "APA") in view of Scott (US 2004/0258099), and further in view of an art of record, WO 02/13421 (hereinafter "Lundh").

Regarding claim 2, the combined teaching of APA and Scott does not teach that the first node is configured to adjust the first oscillator using the frequency adjustment.

However, Lundh teaches a similar frequency synchronization system in which a slave timing unit (equivalent to the first node) is configured to adjust its oscillator (equivalent to the first oscillator) using a synchronization adjustment value (equivalent to frequency adjustment). See page 7, lines 1-12 and claim 32.

Since APA teaches the frequency adjustment (the drift slope ρ) corresponds to the second's (client's) node frequency drift compared to the first node (timeserver) (paragraph 10), and given the teaching of Lundh, it would have been obvious to one skilled in the art at the time of the invention to modify the combined teaching of APA and Scott to include that the first node is configured to adjust the first oscillator using the frequency adjustment as claimed. The suggestion/motivation to do so would have been to enable the initiating node (equivalent to the first node) to adjust the frequency of its oscillator when the initiating node is a slave timing unit as taught by Lundh (page 7, lines 1-2 and 9-11).

Regarding claims 3 and 6, the combined teaching of APA and Scott does not teach that the first node is configured to send a message to the second node to adjust the second oscillator using the frequency adjustment/the one node is the first node configured to send a message to the second node that includes the frequency adjustment for adjusting the second oscillator.

However, Lundh teaches a similar frequency synchronization system in which a master timing unit (equivalent to the first node) sends a synchronization adjustment command message having the synchronization adjustment value to the slave timing unit (equivalent to sending a message to the second node to adjust the second oscillator using the frequency adjustment). See page 6, lines 5-9 and 12-23.

Given the teaching of Lundh, it would have been obvious to one skilled in the art at the time of the invention to further modify the combined teaching of APA and Scott such that the first node would be configured to send a message to the second node to adjust the second oscillator using the frequency adjustment/the one node is the first node configured to send a message to the second node that includes the frequency adjustment for adjusting the second oscillato as claimed. The suggestion/motivation do so would have been to enable the slave timing unit (equivalent to the second node) to perform the frequency adjustment to its oscillator and notify the master unit (equivalent to the first node) as taught by Scott (page 6, lines 9-11).

Regarding claims 9 and 10, although APA teaches that the system is a mobile communications system (paragraph 8), the combined teaching of APA and Scott does not explicitly teach that the first node is a radio base station and the second node is a radio network controller and that the messages between the radio base station and the radio network controller are packet-switched.

However, Lundh teaches a similar frequency synchronization system in which a master timing unit can be located in BS (equivalent to the first node is a radio base station) and a slave timing unit can be located in RNC (equivalent to the second node is a radio network controller) (see page 7, lines 14-20 and claim 38), and that the messages between the radio base station and the radio network controller are packet-switched (messages are transported over IP network, page 8, lines 4-6).

Given the teaching of Lundh, it would have been obvious to one skilled in the art at the time of the invention to modify the combined teaching of APA and Scott such that the first node

would be a radio base station and the second node would be a radio network controller. The suggestion/motivation to do so would have been to enable the slave unit to be located in a diversity handover unit situated at the control node, i.e., RNC as taught by Lundh (page 7, lines 14-16).

Claim 38 and 47 are method claims corresponding to system claims 3 and 9, respectively, and is therefore rejected under the same reason set forth in the rejection of claims 3 and 9, respectively.

Regarding claim 63, APA teaches and that the messages are transported over a packet-switched network (Fig. 3 and paragraph 9). However, the difference between the APA and the claim is that APA teaches that the node and the other nodes are a client P node and a timeserver Q node (Fig. 3 and paragraph 9), respectively, not a timeserver and client node as claimed.

Lundh teaches a similar frequency synchronization system in which a slave timing unit (equivalent to a client node) can transmit the message with timestamps t1, t2, and t3 to a master timing unit (equivalent to a timeserver) in order for the master timing unit to determine a synchronization adjustment value based on timestamps t1, t2, t3, and t4 (page 5, lines 26-page 7, lines 1).

Given the teaching of Lundh, it would have been obvious to one skilled in the art at the time to modify the combined teaching of APA and Scott such that the node would be a timeserver and the other node would be a client node as claimed. The suggestion/motivation to do so would have been to enable the master timing unit determine a synchronization adjustment value for the slave timing unit as taught by Lundh (page 6, lines 5-9).

Allowable Subject Matter

8. Claims 5, 12, 16-17, 39, 43-44, and 48-54 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. Claims 57, 61-62, and 65-70 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

10. Claims 18-33 are allowed. The prior art alone or in combination fail to teach or make obvious on the following when considered in combination with other limitations in the claim: one of the first and second nodes is configured to determine for each received message a first time difference between the corresponding first and second timestamps and a second time difference between the corresponding third and fourth timestamps, and from multiple sets of first and second time differences, to determine a minimum first time difference and a minimum second time difference and to determine from one or both of the minimum first and second time differences one or both of a frequency adjustment to synchronize the first and second oscillators and a time adjustment to synchronize the first and second timers.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- US 7,130,368 B1, disclosing a system and method for synchronizing a local clock to a reference clock using a linear model (Abstract, Fig. 1, and col. 5, lines 14-col. 6, lines 51.

- US 6,983,161 B2, disclosing a method for performing frequency synchronization of a base station and a network part (Abstract, Figs. 3 and 4, and col. 6, lines 18-col. 7, lines 12).

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nittaya Juntima whose telephone number is 571-272-3120. The examiner can normally be reached on Monday through Friday, 8:00 A.M - 5:00 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on 571-272-3155. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Nittaya Juntima
Patent Examiner
April 27, 2007